

Energy consumption guide for nursing and residential homes

Photo by courtesy of Quantum Care Ltd



- How does your building perform?
- Where is energy used?
- How can you provide comfort without waste?



ENERGY EFFICIENCY

INTRODUCTION



ABOUT THIS GUIDE

This Guide is intended for owners and managers responsible for running nursing and residential homes and, where appropriate, other homes. The Guide presents data which allow comparison of the energy use of the home with the results of a survey of care homes country wide. Typical fuel bills of the 52 homes surveyed are divided into good, fair or poor categories.

The Guide introduces the use of energy efficiency to reduce fuel costs in care homes and avoid waste. The aim is to achieve a comfortable and warm environment for residents while avoiding excessive fuel costs.

Fuel bills can be reduced by improving energy management and housekeeping at little or no extra cost. Low-cost measures can

give considerable savings and pay for themselves in a short time. Other measures may be included in the general improvements or refurbishment of a building and can produce further savings.

Estimated savings from energy efficiency measures can typically be:

- about 10% for good housekeeping and energy management
- from 10-40% for a package of low-cost measures.

The benefits of energy efficiency are therefore:

- lower fuel bills
- comfort in the home maintained to a high standard
- fewer environmentally damaging emissions.

THE SURVEY

Energy surveys were carried out in 52 UK nursing and residential care homes. The age and construction of the homes examined ranged from converted Victorian buildings with solid walls to modern purpose-built well-insulated homes with cavity walls.

The energy use information is presented in two forms – cost (£) and energy use (kWh). Each home is placed in one of three bands according to the total cost and amount of energy used, both per unit of floor area and per bed space. The categories used are good, fair and poor, and have been set

OBTAIN FUEL BILLS

CALCULATE FUEL CONSUMPTION

ASSESS SIZE OF HOME

CALCULATE ENERGY PERFORMANCE

ASSESS THE PERFORMANCE OF YOUR HOME

HOW DOES YOUR HOME PERFORM?

Follow the steps below to identify the energy performance of your home. The performance of your home can then be compared with those in the survey (figures 1 and 2).

Step 1 Obtain fuel bills for previous 12 months.

Step 2 Work out your annual fuel consumption, separating electricity from gas or oil. Consumption can be measured in terms of fuel used, or cost.

Fuel use: Generally mains gas and electricity consumption in kWh can be read directly from fuel bills. If other units are used, or if you use a different fuel, use the conversion factors supplied on page 3.

Fuel cost: Read directly from your bills, but remember to exclude any standing charges.

Step 3 Measure the floor area of the home in square metres (m²). If this is not practical, simply count the number of bed spaces in the home*.

Step 4 Divide your electricity and gas or oil use by either floor area or number of bed spaces.

Step 5 Compare your results with those in the survey (figures 1 and 2).

**This figure uses an average floor area of 40m² per bedspace and will be less accurate.*

CATEGORISING YOUR HOME



using the data collected during the energy surveys. The 25% of homes with the lowest fuel bills or consumption are used to classify the good category, the 25% with the highest fuel bills or consumption to classify the poor, and the remaining 50% make up the fair category. Electricity and gas are shown separately so that you can relate them directly to your fuel bills. Figure 2 shows a breakdown of energy cost in terms of £/m² and £/bed space. Prices used are based on a country-wide average of fuel tariffs over the period 1992 to 1995. The consumption data is based on electricity and gas bills for 1993 to 1994.

HOW TO CATEGORISE YOUR HOME

Once you have carried out the instructions in the box 'How does your home perform?' (page 2) you have the information required to categorise your home. The following examples, using annual energy use and annual energy costs, will help you.

- If the total consumption of gas or oil in the home is 120 000 kWh per year and the floor area is unknown but there are 10 bed spaces, then the annual consumption is 12 000 kWh/bed. Figure 1 shows that the home would therefore fall into the fair category for gas/oil consumption.
- Or, if the total cost of electricity consumption is £6/m² of floor area, then using figure 2 the home would be placed in the poor category. This may therefore indicate that whilst all energy usage should be addressed, the priority is to look at electricity consumption.

It should be noted that, due to climate differences, homes located in southern England should require less space heating fuel and should therefore expect to perform slightly better than the average. Similarly homes in northern Scotland may perform slightly worse than average due to the colder northern climate. Variations between regions will not be great however, and with good energy management in the care home, differences should not be significant.

Other external factors which increase the energy use of a home include exceptionally cold weather and high occupancy. If the fuel bills cover a winter where the weather was particularly cold or where more people than normal lived in the home, then this can mean higher fuel bills than usual. It is possible to correct for cold weather using 'degree day' data^[1]. A modern home, which is likely to have been built with higher insulation standards, should score relatively high. Many care homes are old buildings and the data used reflects this – over 80% of the homes in the survey were built before the 1960s.

^[1]Department of the Environment, Practical energy saving guide for smaller businesses, London, DOE, November 1993.

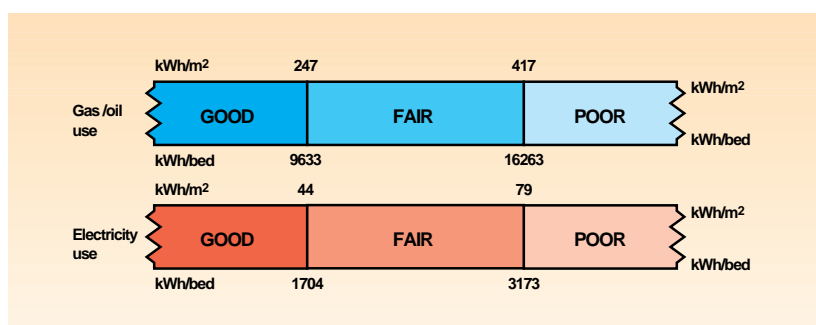


Figure 1 Annual energy use in the care home

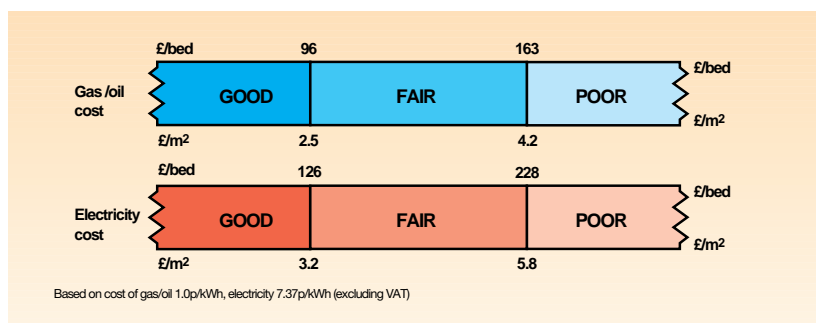


Figure 2 Annual energy costs in the care home

Conversion of fuel use into kWh

Energy will be supplied to the home in the form of gas or oil and electricity. In order to compare energy use with the values shown in figure 1, each fuel must be converted into units of kWh. If the energy use shown on your fuel bills is not in units of kWh then the following factors should be used for conversion:

	Multiply by
1 M J	0.278
1 therm	29.3
100 ft ³ of natural gas	30.0
1 tonne of liquefied petroleum gas (LPG)	13.78
1 litre of gas oil (35 sec)	10.6
1 litre light fuel oil (200 sec)	11.2

ENERGY COSTS

Energy and the environment

The burning of fossil fuels – coal, gas and oil – to generate energy also releases a number of environmentally damaging gases into the atmosphere. These include carbon dioxide (CO₂), which is primarily responsible for global warming, and oxides of sulphur and nitrogen which cause acid rain. The following shows the CO₂ emissions associated with various fuels:

Gas	0.21 kg/kWh of fuel used
Oil	0.29 kg/kWh of fuel used
Electricity	0.70 kg/kWh of fuel used

A typical 30 bed care home categorised as fair, using 320 kWh/m² of gas and 50 kWh/m² of electricity would be responsible for the emission of over 120 tonnes of CO₂ every year.

It is worth noting that the CO₂ emission associated with the use of 1 kWh of electricity is more than three times that for 1 kWh of gas.

Savings in electricity consumption, no matter how small, will therefore produce greater environmental benefits than similar savings in gas or oil.

**BREAKDOWN OF ENERGY USE**

To enable an effective plan of action to be made it is important to understand where energy is used in the care home. Figures 3 and 4 show the average fuel cost and consumption broken down according to use. The miscellaneous category includes uses such as laundry, and small power such as televisions and hair driers. It is clear that the most significant energy use is space heating, accounting for 57% of total use, and hot water generation which accounts for 18%.

Lighting, whilst accounting for only 5% of energy use, actually makes up 20% of the total energy cost. Lighting forms a greater proportion of total fuel costs than domestic hot water generation.

The figures highlight the fact that where electricity is used, for example for refrigeration and lighting, it makes up a proportionately larger amount of total fuel costs than gas or oil. Clearly the implication is that any reduction in electricity use gives a greater cost saving than an equivalent reduction in gas consumption.

HOW TO REDUCE FUEL BILLS IN CARE HOMES

It is possible to make considerable savings in fuel bills in a care home, often for little or no cost, by managing energy use and using energy efficiently. Introducing energy efficient improvements during day-to-day maintenance or as part of refurbishment will also give fuel bill savings.

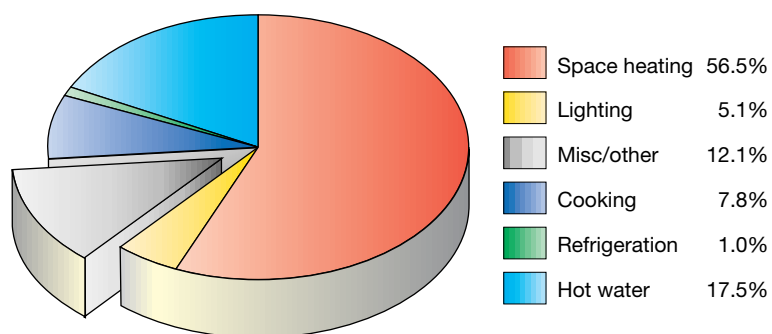


Figure 3 Energy use (kWh) breakdown

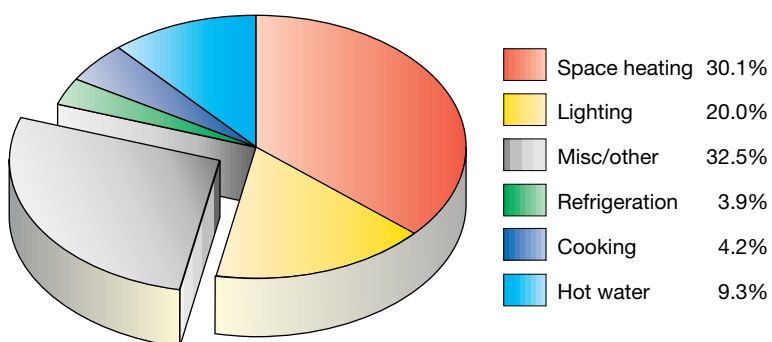


Figure 4 Energy cost breakdown

GOOD HOUSEKEEPING MEASURES



GOOD ENERGY HOUSEKEEPING

Using this Guide to compare the gas or oil and electricity use of the home with other homes is a major step in the management of fuel costs. It is important to read gas and electricity meters regularly, for example at least at the end of every month, and calculate how much fuel has been used. Plotting these figures on a graph such as the one illustrated will highlight significant changes. If any increase cannot be explained by, for example colder weather, then it is appropriate to investigate further. Reasons for an increase in fuel bills may include:

- heating and hot water thermostats set too high and timer settings changed
- equipment left on or windows left open
- insulation damaged or misplaced.

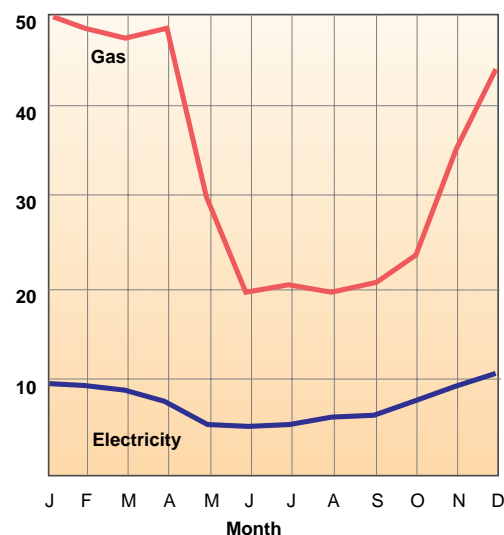
Once monitoring has been carried out for more than 12 months you can compare readings with previous years to achieve year-on-year reductions in energy consumption in the home.

Other ways of managing fuel bills include:

- carrying out an energy efficiency survey in the home
- running an energy saving campaign
- incorporating energy efficiency in general maintenance surveys
- checking equipment use
- carrying out regular building energy checks.



Meter readings, kWh (000s)



More information on energy management and good energy housekeeping is given in Good Practice Guide 193 (GPG 193) 'Good housekeeping in nursing and residential homes' (available from BRECSU, see page 6).

ENERGY EFFICIENT IMPROVEMENTS

Energy efficient improvements will reduce fuel bills while ensuring the same or better levels of comfort for residents. Many of these measures cost very little and pay for themselves in a short time. These measures can be addressed as part of:

- general maintenance
- planned improvements
- major works during refurbishment.

General maintenance and housekeeping

Energy efficiency in maintenance includes:

- keeping thermostats and programmers set correctly
- repairing dripping hot water taps
- ensuring doors and windows close properly
- checking draughtstripping on doors and windows
- avoiding the use of supplementary electric heaters
- repairing damaged or misplaced hot water cylinder and pipe insulation.

OPPORTUNITIES FOR ENERGY IMPROVEMENTS

Planned improvements

Planned low-cost improvements could include:

- installing draughtstripping
- fitting push-button light switches in cupboards and storerooms
- replacing conventional bulbs with compact fluorescent bulbs or fluorescent strip lighting
- installing thermostats and thermostatic radiator valves
- improving loft, pipe and hot water cylinder insulation
- installing cavity wall insulation
- installing night temperature setback for the heating system.

Energy improvements may also be carried out as part of a general refurbishment.

Energy improvements in refurbishment

Refurbishing any part of a home is an important time to consider energy efficiency improvements. They can often be included at relatively little extra cost, with considerable benefits. Improvements could include:

- insulating solid walls in older homes (built before the 1940s)
- installing a condensing boiler when replacing the heating system
- fitting heating controls such as weather compensation
- installing new lighting controls
- fitting double glazing (when replacing windows)
- fitting trickle vents
- decentralising the domestic hot water
- using energy efficient appliances.

FUEL COSTS AND TARIFFS

Fuel costs will vary between different regions. In addition, different regional electricity companies offer a range of tariffs. If a significant proportion of electricity is used at night or during the weekend there may be a tariff available which could reduce the electricity bill for the home.

Larger homes may also benefit from switching to a monthly billing system. Discounts are also usually available if bills are paid by direct debit. Contact your fuel supplier for more details.

FURTHER READING

Other Guides available within the Department of the Environment's Energy Efficiency Best Practice programme give detailed information on energy efficient refurbishment, insulation, heating, ventilation, lighting and draughtstripping. These are available from the BRECSU Enquiries Bureau. Contact details are given at the bottom of this page.



The Government's Energy Efficiency Best Practice programme provides impartial, authoritative information on energy efficiency techniques and technologies in industry and buildings. This information is disseminated through publications, videos and software, together with seminars, workshops and other events. Publications within the Best Practice programme are shown opposite.

Visit the website at www.energy-efficiency.gov.uk
Call the Environment and Energy Helpline on **0800 585794**

For further specific information on:

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Energy Consumption Guides: compare energy use in specific processes, operations, plant and building types.

Good Practice: promotes proven energy-efficient techniques through Guides and Case Studies.

New Practice: monitors first commercial applications of new energy efficiency measures.

Future Practice: reports on joint R&D ventures into new energy efficiency measures.

General Information: describes concepts and approaches yet to be fully established as good practice.

Fuel Efficiency Booklets: give detailed information on specific technologies and techniques.

Introduction to Energy Efficiency: helps new energy managers understand the use and costs of heating, lighting, etc.